SLOVENSKI STANDARD
oSIST prEN IEC 62282-6-101:2023

01-marec-2023

Tehnologije gorivnih celic - 6-101. del: Elektroenergetski sistemi z mikro gorivnimi celicami - Varnost - Splošne zahteve

Fuel cell technologies - Part 6-101: Micro fuel cell power systems - Safety - General requirements

Technologies des piles à combustible - Partie 6-101: Systèmes à micropiles à combustible - Sécurité - Exigences générales

Ta slovenski standard je istoveten z: **prEN IEC 62282-6-101:2022**

ICS:

27.070	Gorilne celice	Fuel cells

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105/949/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 62282-6-101 ED1	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2022-12-23	**2023-03-17**
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105/807/CD, 105/821A/CC	

IEC TC 105 : FUEL CELL TECHNOLOGIES	
SECRETARIAT: Germany	SECRETARY: Mr David Urmann
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING
Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Fuel cell technologies – Part 6-101: Micro fuel cell power systems – Safety – General requirements

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FUEL CELL TECHNOLOGIES –

Part 6-101: Micro fuel cell power systems – Safety – General requirements

FOREWORD

The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62282-6-100 Ed. 1 was prepared by IEC technical committee 105: Fuel cell technologies.

According to 105/266/DC the Standard IEC 62282-6-100 will be restructured to make it more user friendly.

The new standard series will consist of Part 6-101 and further Parts 6-1xxx.

Part 6-101 and subsequent Parts 6-1xxx will the replace IEC 62282-6-100, on a case by case basis, as fuel specific Part 2 standards are completed, a suitable transition period will be needed.

Part 101 will deal with general safety requirements common for all fuel technologies

Part 6-102 until 6-1xxx will deal with specific fuel technologies based on Part 6-101.

This constitutes a technical revision.

The main changes with respect to the previous edition are as follows:

a) IEC 62282-6-100 has been reformatted into two parts. Part 1 covers general requirements. Separate Part 2 documents cover detailed requirements for specific fuel cartridges, as follows:

IEC Technology Supplement Standard	Title
62282-6-102	Fuel cell technologies – Part 6-102: Micro fuel cell power systems – Safety – Formic acid
62282-6-106	Fuel cell technologies – Part 6-106: Micro fuel cell power systems – Safety – Indirect Class 8 (Corrosive) Compounds
62282-6-107	Fuel cell technologies – Part 6-107: Micro fuel cell power systems – Safety – Indirect water reactive (UN Division 4.3) compounds

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 62282 series, under the general title Fuel cell technologies, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE: The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months from the date of publication.

A bilingual version of this publication may be issued at a later date.

FUEL CELL TECHNOLOGIES –

Part 6-101: Micro fuel cell power systems – Safety – General requirements

1 Scope

1.1 General

a) This consumer safety standard covers micro fuel cell power systems and fuel cartridges that are wearable or easily carried by hand, providing d.c. (direct current) outputs that do not exceed 60 V d.c. and power outputs that do not exceed 240 VA. Portable fuel cell power systems that provide output levels that exceed these electrical limits are covered by IEC 62282-5-1.

b) Externally accessible circuitry is therefore considered to be ES1 energy source as defined in IEC 62368-1, and as limited power source if further compliance with Annex Q of IEC 62368-1 is demonstrated. Micro fuel cell power systems that have internal circuitry exceeding 60 V d.c. or 240 VA should be appropriately evaluated in accordance with the separate criteria of IEC 62368-1.

c) This consumer safety standard covers micro fuel cell power systems and fuel cartridges. This standard establishes requirements for micro fuel cell power systems and fuel cartridges to ensure a reasonable degree of safety for normal use, reasonably foreseeable misuse, and cargo and consumer transportation and storage of such items. The fuel cartridges covered by this standard are not intended to be refilled by the consumer. Fuel cartridges refilled by the manufacturer or by trained technicians shall meet all requirements of this standard.

d) These products are not intended for use in hazardous areas as defined by IEV 426-03-01.

1.2 Fuels and technologies covered

a) A micro fuel cell power system block diagram is shown in Figure 1.

b) All portions of this standard, including all annexes, apply to micro fuel cell power systems and fuel cartridges as defined in Subclause 1.1 above.

c) Clauses 1 through 8 of this standard covers general safety requirements for all micro fuel cell power systems. IEC 62282-6-101 plus the appropriate technology standard in Table 1. Table **1** is required to include the complete set of safety requirements for that technology.

Table 1 - Technology Specific Parts

IEC Technology Supplement Standard	Title
62282-6-106	Fuel cell technologies – Part 6-106: Micro fuel cell power systems – Safety - Indirect Class 8 (corrosive) compounds"
62282-6-107	Fuel cell technologies – Part 6-107: Micro fuel cell power systems – Safety – Indirect water reactive (UN Division 4.3) compounds

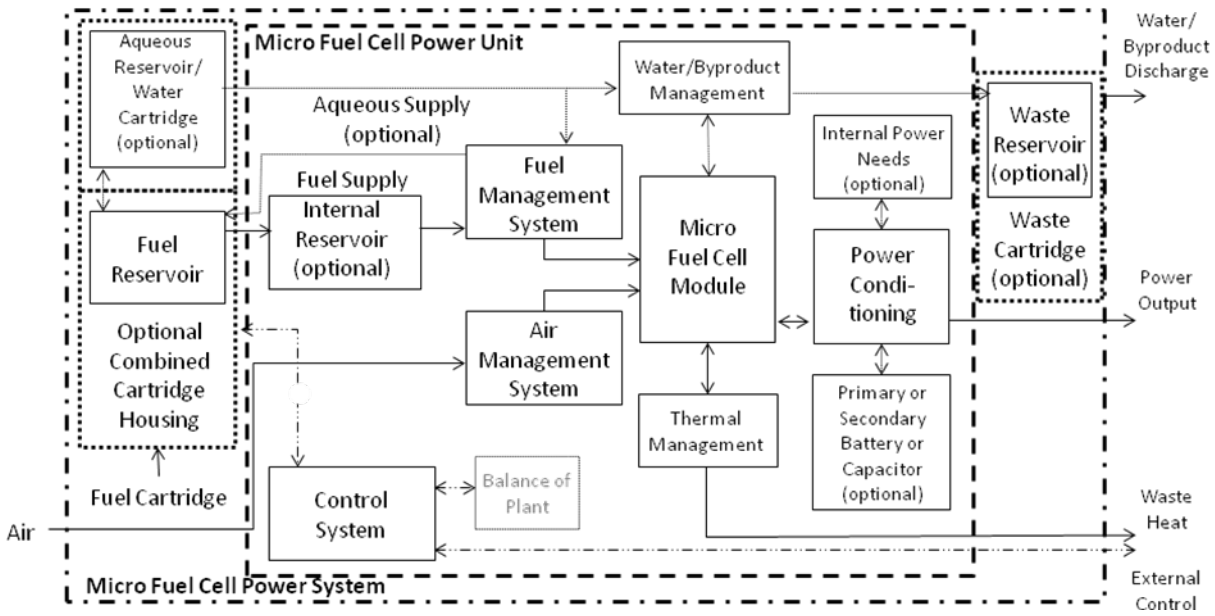

Figure 1 – Micro fuel cell power system block diagram

1.3 Equivalent level of safety

a) The requirements of this standard are not intended to constrain innovation. The manufacturer may consider fuels, materials, designs or constructions not specifically dealt with in this standard. These alternatives should be evaluated as to their ability to yield levels of safety equivalent to those prescribed by this standard.

b) It is understood that all micro fuel cell power systems and fuel cartridges shall comply with applicable country and local requirements including, but not limited to, those concerning transportation, child-resistance and storage, where required.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60086-4, Primary batteries – Part 4: Safety of lithium batteries

IEC 60086-5, Primary batteries – Part 5: Safety of batteries with aqueous electrolyte

IEC 60730-1, Automatic electrical controls – Part 1: General requirements

IEC 60812, Analysis techniques for system reliability – Procedure for failure mode(s) and effects analysis (FMEA)

IEC 61032:1997, Protection of persons and equipment by enclosures – Probes for verification

IEC 61025, Fault tree analysis

IEC 62133, Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications

IEC 62281:2019:RLV, Safety of primary and secondary lithium cells and batteries during transport

IEC 62368-1, RLV, Audio/Video, Information and communication technology equipment – Part 1: Safety requirements

IEC 62282-6-300:2012, Fuel cell technologies – Part 6-300: Micro fuel cell power systems – Fuel cartridge interchangeability

ISO 175, Plastics – Methods of test for determination of the effects of immersion in liquid chemicals

ISO 188, Rubber, vulcanized or thermoplastic – Accelerated ageing and heat resistance tests

ISO 1817, Rubber, vulcanized – Determination of the effect of liquids

ISO 7010:2019, Graphical symbols — Safety colours and safety signs — Registered safety signs

ISO 11114-1, Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 1: Metallic materials

ISO 11114-2, Transportable gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials

ISO 11114-4, Transportable gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 4: Test methods for selecting metallic materials resistant to hydrogen embrittlement

ISO 15649, Petroleum and natural gas industries – Piping

ISO 16000-3, Indoor air – Part 3: Determination of formaldehyde and other carbonyl compounds – Active sampling method

ISO 16000-6, Indoor air – Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA sorbent, thermal desorption and gas chromatography using MS/FID

ISO 16017-1, Indoor, ambient and workplace air – Part 1: Sampling and analysis of volatile organic compounds by sorbent tube/thermal desorption/capillary gas chromatography – Part 1: Pumped sampling

ISO 16111:2018, Transportable gas storage devices – Hydrogen absorbed in reversible metal hydride

United Nations Recommendations on the Transport of Dangerous Goods:
Model Regulations: Twentieth revised edition
Manual of Tests and Criteria: Sixth revised edition

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 air management system
components that might be used to control air properties if needed to support micro fuel cell power system operation.

3.2 attached cartridge
fuel cartridge, which has its own enclosure that connects to the device powered by the micro fuel cell power system

3.3 aqueous reservoir
optional reservoir within a fuel cartridge which contains an aqueous solution used in fuel processing

NOTE: any hazards associated with aqueous solutions should be addressed in the FMEA or in a fuel specific standard.

3.4 control system

components of the micro fuel cell power system that coordinate properties of the micro fuel cell power system and reactants using electrical, mechanical, and/or digital inputs, outputs, software, and/or functions to effect proper micro fuel cell power system start-up, operation and shutdown, when necessary

3.5 corrosive liquid

an aqueous solution with pH < 3.5 or pH > 10.5 or any liquid which can cause full thickness destruction of skin after not more than 60 minutes exposure when observed after 14 days, or which otherwise meets the criteria of UN class 8 materials

3.6 electrical enclosure

parts of the micro fuel cell power system intended to limit access to parts that may be at hazardous voltages or hazardous energy level

3.7 exterior cartridge

fuel cartridge, which has its own enclosure that forms a portion of the enclosure of the device powered by the micro fuel cell power system

3.8 fire enclosure

parts of the micro fuel cell power system intended to minimize the spread of fire or flames from within

3.9 flammable liquid

a liquid meeting the criteria for inclusion in UN Class 3, flammable liquid (i.e. having a flash point of not more than 60.5 °C)

3.10 flammable gas

a gas meeting the criteria for inclusion in UN division 2.1, flammable gas (i.e. any material which is a gas at 20 °C or less and 101.3 kPa of pressure which is ignitable at 101.3 kPa when in a mixture of 13 percent or less by volume with air; or has a flammable range at 101.3 kPa with air of at least 12 percent regardless of the lower limit)

3.11 fuel

Energy containing material used directly from the cartridge or indirectly, after processing and conversion, in the electrochemical reaction of the fuel cell.

3.12 fuel cartridge

article that stores fuel

3.13 fuel cell

electrochemical device that converts the chemical energy of a fuel and an oxidant to electrical energy (d.c. power), heat and reaction products

3.14 fuel cell power system

system that uses a fuel cell to generate electric power and heat

NOTE: a fuel cell power system is composed of all or some of the systems shown in Figure 1.

3.15 fuel management system

optional components used to control fuel or hydrogen properties (e.g. concentration, flow rate, purity, temperature, humidity or pressure) if needed to support micro fuel cell power system operation and/or storage of generated reactants

Not all micro fuel cell power systems will include all functions. Some micro fuel cell power systems will include additional functions.

3.16 gas loss

hazardous gas emission, as determined in accordance with Clause 4.2 and 5.2

3.17 hazardous substance (hazardous solid, hazardous liquid or hazardous gas)

any solid, liquid or gas/vapour which meets the criteria for being hazardous as defined in Clause 4.2 and 5.2 of this Standard.

3.18 incompatible materials

materials which are likely to cause a dangerous evolution of heat, or flammable or poisonous gas or vapours if allowed to mix in ways other than those specifically provided for by the micro fuel cell power system design

3.19 internal reservoir

structure in a micro fuel cell power system that stores fuel and cannot be removed but not including fuel lines or fittings not intended to provide sustained fuel storage.

3.20 insert cartridge

fuel cartridge, which has its own enclosure and is installed within the enclosure of the device powered by the micro fuel cell power system